

Living Lights



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“Look at nature, that's where your future is.”

- Leonardo Da Vinci

During my childhood, some of the earliest and most fascinating memories of experience with the natural lights that I have had were of watching fireflies for the first time or marvelling at the starlight on clear nights. Natural light is omnipresent. It has been the imperative source of all life on Earth in the entire solar system ever since the Big Bang millenniums prior. The Sun has been our only provider of this valuable energy in its pure natural form without which life wouldn't have evolved to begin with. But is that all? In the world of 21st century light is one of the most coveted services but not in its natural form. With the advance of urbanisation and expansion of cities, we have been able to practically banish darkness from our lives by turning the nights into something almost akin to day with the glare of our artificial lights. But is it for the better or the worse? What is the cost we have to pay for banishing darkness from our lives?

The price we pay today for eliminating the darkness is the price of Light and Visual Pollution. As estimated by scientists and reported by BBC, about 80% of the world's population resides under light polluted skies and 1/3rd of the world's population can't even see the stars or Milky Way anymore. 23% of the world's land is affected by the severe case of over-illumination such as sky glow, light clutter, glare or light trespass. The population of Singapore, Kuwait and Qatar are the worst ones to get affected by the brightest night skies. Today's lighting technologies contribute to not only to over-illumination but also to global warming, human health ailments, threatening our

planet's natural resources and its biodiversity (especially nocturnal creatures). Ironically, Nature already had the solution for this problem by developing through evolution the most efficient and intriguing lighting solution which is neither solar power nor wind power but “bioluminescence”. GLOWEE has decided to emulate this natural wonder and use this super-power to develop biological lighting and hence jump-start the bio-economy.



GLOWEE is a Paris based biotechnology company that aims at producing sustainable, pollution free natural lighting in cityscapes with help of bioluminescent bacteria and microbes. The venture wishes to revolutionize and reinvent the lighting system as we know it today to develop a living biological lighting system which is 100% organic and biodegradable. Bioluminescence is the production and emission of light by certain living organisms such as fireflies or glow-worms, but also more than 80% of marine organisms. The idea first developed in 2013 as a brain-child of the founder and CEO of the company Sandra Rey only to take form of an organization in the year hence.

The company wishes to develop a living raw material made of marine bacteria that are naturally bioluminescent and easily cultivable to infinity in the laboratory and doesn't require extraction of any natural resources. This reduces the consumption of limited resources and the pollution generated by their extraction, transformation and



Source: <https://www.wired.co.uk/article/glowee-squid-power>

export which translates to 90% loss of biodiversity and water pollution. The procedure that is employed is that of basic biotechnology. The segment of DNA or gene of the marine bioluminescent bacteria which is responsible for the light emitting phenomenon is inserted into non-toxic or non-pathogenic bacteria *Escherichia coli* which is readily available and produces clean,

safe, synthetic bioluminescence. Once engineered and grown, the bacteria are encapsulated into a transparent shell, alongside a medium (either liquid, gel or protein solution) composed of the nutrients and oxygen they need to live and make light. The shell can take any shape, from window stickers to more conventional lamps and provide a sustainable and pollution-free soft green glow which can be integrated into urban cityscape thereby fixing the issue of light and visual pollution and its adverse impacts upon environment and human health. At the end of the life of the products, the bio-mass of these marine microbes can be revalued and recycled as bio-plastics, bio-fuels, and bio-manure thereby not requiring any special disposal.

Although today the complete paradigm shift to bioluminescence is still a far cry in the urban lighting system due to several drawbacks and technical difficulties but the step towards such a sustainable innovation is perhaps what we would need in the future to transform the sky glows into the starry night skies that they used to be. Perhaps sometime in distant future it will be these creatures of the seas that will enlighten our cities at night with their soothing green glow allowing our eyes a respite from the glare of the artificial lights.